

# CLAIMS

1. A method of extracting information elements from a colour-containing digital image, the method comprising:

- 5           - distinguishing, in the digital image, connected components formed of contiguous pixels with a same colour;
- dividing connected component into background connected components and other connected components and grouping contiguous ones of said other connected components;
- allocating connected components belonging to a group of said other connected
- 10 components to a foreground or to the background on the basis of a predetermined allocation criterion; and
- combining contiguous connected components allocated to the foreground and extracting a combined entity as an information element.

2. The method according to claim 1, also comprising a preparation step which comprises:

- 15           - quantising the colours occurring in a digital image for processing, into a limited number of quantised colours, and replacing colours originally occurring in the image signals by quantised colours.

3. The method according to claim 1, wherein

- 20           said allocation criterion is based on a comparison of the colour of a connected component for allocation with the colours of a group of said other connected components of which the connected component for allocation forms part, and also with the colour of a background connected component which at least partially surrounds the connected component for allocation.

4. The method according to claim 3, wherein

- 25           said allocation criterion is based on a comparison of the colour of a connected component for allocation with the average of the colours of the group of connected components of which the connected component for allocation forms part, and also with the colour of the background connected component.

5. The method according to claim 4, wherein

- 30           said allocation criterion is as follows: when the colour of a connected component for allocation corresponds more to the average of the colours of the group of connected components of which the connected component for allocation forms part than to the colour of the background connected component, the connected component for allocation is allocated to the foreground.

6. The method according to claim 1, wherein said other connected components are first divided into types on the basis of their properties and wherein only connected components of

35 predetermined types are analysed with the said allocation criterion.

7. A method of automatically interpreting a colour-containing digital image, the method comprising:

extracting information elements from the colour-containing digital image according to claim 1; and

5 performing an automatic interpretation processing on the basis of the extracted information elements.

8. The method according to claim 7, wherein the automatic interpretation processing comprises a lay-out analysis.

9. The method according to claim 7, wherein the automatic interpretation processing  
10 comprises a character recognition.

10. The method according to claim 7, wherein the automatic interpretation processing comprises a recognition of graphic elements in the image.

11. An apparatus for extracting information elements from a colour-containing digital image, the apparatus comprising:

15 - receiving means for receiving digital image signals corresponding to a colour-containing image.

- a classification module for distinguishing connected components formed of contiguous pixels with the same colour in the digital image signals;

20 - a dividing module for dividing connected components into background connected components and other connected components and grouping contiguous ones of said other connected components;

- an allocation module for allocating connected components to a foreground or to the background on the basis of a predetermined allocation criterion; and

25 - a combination module for combining contiguous connected components allocated to the foreground and extracting a combined entity as an information element.

12. The apparatus according to claim 11, also comprising

- a colour quantisation module for quantising colours occurring in the digital image signals for processing into a limited number of quantised colours and replacing colours originally occurring in the image signals by quantised colours.

30 13. The apparatus according to claim 11, wherein

- said allocation criterion is based on a comparison of the colour of a connected component for allocation with the colours of a group of the said other connected components of which the connected component for allocation forms part, and also with the colour of a background connected component which at least partially surrounds the connected component for allocation.

35 14. The apparatus according to claim 13, wherein

- the said allocation criterion is based on a comparison of the colour of a connected component for allocation with the average of the colours of the group of connected components of which the connected component for allocation forms part, and also with the colour of the background connected component.

5        15. The apparatus according to claim 14, wherein

- said allocation criterion is as follows: when the colour of a connected component for allocation corresponds more to the average of the colours of the group of connected components of which the connected component for allocation forms part than to the colour of the background connected component, the connected component for allocation is allocated to the foreground.

10       16. The apparatus according to claim 11, wherein

the classification module is provided with means for classifying said other connected components on the basis of their properties into types and

wherein a selection module is provided for selecting connected components of predetermined types and passing only the selected connected components to the dividing module.

15       17. An apparatus for automatically interpreting a colour-containing digital image, the apparatus comprising:

an apparatus for extracting information elements from the colour-containing digital image according to claim 11, and

20       an interpretation unit for performing an automatic interpretation processing on the basis of the extracted information elements.

18. The apparatus according to claim 17, wherein the automatic interpretation processing comprises a lay-out analysis.

19. The apparatus according to claim 17, wherein the automatic interpretation processing comprises character recognition.

25       20. The apparatus according to claim 17, wherein the automatic interpretation processing comprises recognition of graphic elements in the image.

21. A computer program product with program code stored on a machine-readable medium, for performing the method according to claim 1.

30       22. A computer program product with program code stored on a machine-readable medium, for performing the method according to claim 7.